

Syllabus – Practical Exercises of Biophysics – dentistry 2021

Laboratory 1

(students work in smaller groups according to the schedule, detailed instructions for individual tasks are in the IS)

Task I. Basics optical laboratory methods

Spectrophotometry – Absorption curve and determination of concentration of eosin

Refractometry – Determination of NaCl concentration

Task II. Properties of liquids

The surface tension of liquids.

Viscosity measurement.

Task III. Ultrasound and ionising radiation

Hemolysis of erythrocytes by ultrasound

Measuring ionising radiation absorption

Laboratory 2

(students work in smaller groups according to the schedule, detailed instructions for individual tasks are in the IS)

Task IV. Electrical parameters

Measuring the voltage and frequency of electric signals with the oscilloscope

Frequency dependence of tissue and tissue model impedance.

Skin resistance measurement

Task V. Monitoring

Measurement of skin temperature – Thermocouple,

Blood pressure measurement by the auscultation method

Task VI. Electrical parameters

Conductometry – electrical parameters of membranes

Audiometry – hearing, sound intensity

Blood flow measurement by the Doppler ultrasonic flowmeter

Collective Exercises

This tasks we will do together, so it is very important to prepare theoretically and use for preparation all accessible sources. Main and most important source for you is the **Fundamentals of Biophysics and Medical Technology** (Hrazdira et al, 2012), but many informations you can find at the other places (libraries, internet...).

Task I. Electromagnetic radiation an its perception.

Required knowledge:

Properties of electromagnetic radiation including basic formulas. Spectrum of the EMR.

Measurement of the illuminance.

Contact and contactless thermography. Thermocamera and thermovision.

Task II. Electric currents. ECG measurement. Physiotherapy.

Required knowledge:

Properties of electric currents. Effect of the direct and alternating currents to the biological objects.

Electrotherapeutic methods. Electrical excitability. Electrodiagnostic methods (active, passive).

Physics in dentistry (ultrasound, laser and others).

Task III. Imaging methods. Ultrasound imaging of the gallbladder. X-ray images.

Required knowledge:

Properties and production of ultrasound. Medical applications and principles of ultrasound - diagnostic and therapeutic usage in dentistry.

Properties of X-rays and medical applications including CT.